

# Claims

- [c1] A rain runoff gauge, comprising:
- a collector tube having an opening for receiving precipitation;
  - an infiltration circuit providing a reference soil infiltration resistance in communication with the collector tube;
  - a runoff circuit in communication with the collector tube providing runoff characteristics of a surface of the reference soil;
  - a runoff collection tube to receive runoff from the runoff circuit, and
  - a measurement system for reading runoff to the runoff collection tube.
- [c2] The runoff gauge of claim 1, wherein the runoff circuit includes an air backflow seal between the collector tube and the runoff collection tube.
- [c3] The runoff gauge of claim 2, further comprising:
- a balance line attached between the runoff collection tube and a ground surface to maintain a backpressure head in the runoff circuit matching a water depth above the ground surface.

- [c4] The runoff gauge of claim 3, further comprising:
  - a ground connector attached to the balance line having one or more apertures at a distal end, wherein said distal end is in contact with the ground surface.
- [c5] The runoff gauge of claim 1, further comprising an insulating shroud located about the collector tube.
- [c6] The runoff gauge of claim 1 wherein the collector tube includes a removable bottom closure having a drain hole.
- [c7] The runoff gauge of claim 6 wherein the bottom closure of the collector tube includes a substantially vertical drip tube.
- [c8] The runoff gauge of claim 1 wherein the collector tube is cylindrical with an open bottom to receive a sample of the reference soil when inserted directly into ground.
- [c9] The runoff gauge of claim 1 wherein the collector tube further comprises a high level recorder.
- [c10] The runoff gauge of claim 9 wherein the high level recorder comprises a rod coated with a water resistant material painted with a water-soluble dye, and a cap positioned within the collector tube above the infiltration circuit and having a surface area smaller than a cross-sectional area of the collector tube.

- [c11] The runoff gauge of claim 1 wherein the infiltration circuit includes a reference soil specimen.
- [c12] The runoff gauge of claim 1, wherein the runoff collection tube includes a drain valve.
- [c13] The runoff gauge of claim 1, further comprising a frame connected to the collector tube, a standard rain gauge and the runoff collection tube, wherein the frame is attached to support to maintain the rain gauge and collector tube in a vertical orientation with openings above ground level to receive precipitation.
- [c14] The runoff gauge of claim 1 wherein the runoff circuit includes an independently adjustable runoff resistance.
- [c15] The runoff gauge of claim 14, the runoff circuit further comprising:
  - an upper horizontal tube and a lower horizontal tube, the horizontal tubes connected by an upstream vertical tube and a downstream vertical tube;
  - wherein the upper horizontal tube connects an outlet of the collector tube and an inlet of the runoff collection tube, and includes a non-permeable plug therein, and the lower horizontal tube includes a filter medium; and
  - a screw in the downstream vertical tube to adjust

flow resistance.

- [c16] A method for measuring rain runoff, comprising:
- collecting precipitation in a collector tube;
  - passing a first portion of the collected precipitation to an infiltration circuit providing infiltration resistance characteristics of a reference soil;
  - passing a second portion of the collected precipitation to a runoff circuit providing runoff characteristics of a surface of the reference soil;
  - collecting the second portion in a runoff collection tube; and
  - measuring the precipitation collected in the runoff collection tube.
- [c17] The method of claim 16, further comprising:
- developing a pressure imbalance wherein a head of water in the collector tube is greater than a back-pressure head in the runoff circuit provided by a ground level water depth; and
  - passing water from the collector tube through the runoff circuit to restore pressure balance.
- [c18] A method for measuring soil infiltration of rain, comprising:
- measuring total precipitation;
  - measuring rain runoff according the method of claim

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determining soil infiltration by the difference between the total precipitation and the rain runoff.

[c19] A method for calibrating the runoff rain gauge of claim 14, comprising:

measuring an average maximum water depth for the reference soil and a maximum water depth for the collector tube during a rain event; and  
adjusting the runoff resistance in proportion to any difference between the measured average maximum water depth for the reference soil and the maximum water depth for the collector tube.

[c20] A method for measuring maximum water depths with a high level recorder comprising:

painting a rod with a water-soluble dye;  
positioning the rod vertically inside a perforated tube;  
anchoring the perforated tube on a reference soil;  
allowing rainwater from a rain event to enter the perforated tube and dissolve the dye on the rod as the water level increases;  
allowing the perforated tube to drain once the rain event subsides;  
measuring the maximum depth of the water based upon the dye remaining on the rod; and

measuring the maximum depth of water on a soil infiltration surface inside a collector tube of a rain runoff gauge, wherein the gauge includes a painted rod positioned inside the collector tube.

[c21] A method for cultivating plants growing in soil, comprising:

positioning a rain runoff gauge adjacent a soil location, wherein the gauge includes a collector tube, an infiltration circuit and a runoff circuit, the infiltration circuit providing an infiltration resistance having characteristics of the soil and the runoff circuit providing runoff characteristics of a surface of the soil; collecting ambient precipitation in the collector tube; passing a first portion of the collected precipitation through the infiltration circuit; passing a second portion of the collected precipitation through the runoff circuit and collecting the second portion in a runoff collection tube; measuring the second portion in the runoff collection tube; measuring total precipitation; and irrigating the soil as a function of the measured runoff and measured precipitation.